JOURNAL SCAN

Journal scan

Edited by Jim Wardrope; this scan coordinated by Rob Russell

Missed diagnosis of acute cardiac ischaemia in the emergency department

J H Pope, T P Aufderheide, R Ruthazer *et al*
N Engl J Med 2000;**342**:1163–70

Objectives—To describe the incidence of, factors related to, and clinical outcome of a failure to admit patients with acute cardiac ischaemia.
Methods—10 689 patients attending 10 US emergency departments with chest pain or other symptoms suggestive of acute cardiac ischaemia were studied in a multi-centre prospective clinical trial. Patients that were sent home attended for repeat examination, ECG and CK-MB within 72 hours of discharge.
Results—There was 99% follow up. A total of 1866 (17%) patients had acute cardiac ischaemia (8% MI, 9% unstable angina). Twenty seven per cent had stable angina or other cardiac problems. Fifty five per cent had non-cardiac pain. Nineteen (2.1%) of the 889 patients with acute MI and 22 (2.3%) of the 966 patients with unstable angina were sent home. Factors associated with mistaken discharge were female sex and age <55, non-white race, shortness of breath as main symptom and a normal or non-diagnostic ECG. Patients with acute MI who were sent home had the same crude mortality rates as those admitted to hospital (home 10.5%, hospital 9.7%) but when these rates were adjusted for various risk factors the mortality ratio was almost doubled (1.90). Those sent home with unstable angina did have both a higher crude mortality rate (home 9.8%, hospital 5.5%) and adjusted mortality ratio (1.7).
Conclusions—Few patients are mistakenly discharged with acute cardiac ischaemia but their mortality is higher. Absence of typical symptoms or ECG changes are associated with mistaken discharge.
Critique—This is an important problem. This paper aimed to identify the incidence of wrongful discharge along with the factors and consequences associated. The actual mortality rates of those sent home with acute MI and those admitted were similar although the risk adjusted mortality ratios were increased but the increases did not achieve statistical significance. Further explanation is required of the methodology of risk adjusted mortality ratios. Another weakness is that 929 patients were excluded from the study. No reason is given for these exclusions and this throws some doubt on the 99% follow up rate. Although excluded patients matched study patients for sex and race no explanation is given as to why they were omitted.

There is no mention of the proportion from the overall population who were admitted. Obviously the lower the threshold for admission, the less likely there is to be an error.

The study was carried out over seven months in 1993–4. No reason for the delay in publication is given. Further methods to identify acute ischaemia are now more widely available.

Evaluation of the patient with acute chest pain

T H Lee, L Goldman
N Engl J Med 2000;**342**:1187–94

This is another excellent review of a common clinical problem in accident and emergency (A&E) department practice. This review article describes the evaluation of the patient with acute chest pain and gives some useful tactics for improving diagnostic accuracy. There is a clear discussion of the uses and limitations of CK-MB, troponin I and troponin T measurements. The author suggests that bedside troponin tests may not be the breakthrough many think, and warns against relying on single measurements even in patients with more than 12 hours of chest pain.

An algorithm provides a strategy for dividing patients into very low, low, intermediate and high risk groups and the management of each is discussed. No overall decision protocol is given, which would have been useful, but several prospectively validated protocols are refered to and referenced. A clear table reproduces the American College of Emergency Physicians clinical policy for different types of chest pain and other variables.

The final sections cover chest pain evaluation units and other strategies for reducing the length of stay. One example being early exercise stress testing within six hours of the onset of symptoms in patients judged to be at low or very low risk of MI.

This article should be compulsory reading for all A&E clinicians.

Thoracic aortic injury: How predictive is mechanism and is chest computed tomography a reliable screening tool? A prospective study of 1 561 patients

D S Dyer, E E Moore, D N Ilke, *et al*
J Trauma 2000;**48**:673–83

Objectives—To determine the mechanism characteristics that are predictive of thoracic aortic

Accident and Emergency Department, Northern General Hospital, Herries Road, Sheffield S5 7AU
J Wardrope

Royal Defence Medical College, Gosport
R Russell

Correspondence to:
Mr Wardrope, Editor
(jimwardrope@hotmail.com)

injury (TAI) and to evaluate chest computed tomography (CT) as a screening tool for TAI.
Methods—A prospective study of 1561 blunt chest trauma patients attending Level One trauma centres in the United States. The clinician initially assessing the patients assigned scores of 1 (low suspicion) to 5 (very high suspicion) of TAI on the basis of both their mechanism of injury and the appearance of their plain chest radiograph. If there was very high suspicion of TAI immediate aortography was carried out, otherwise chest CT was performed. All positive CTs and all patients with a mechanism score of 4 or 5 had aortography. Mechanism and radiographic scores were correlated with the results of the aortic imaging.
Results—30 aortic injuries were identified. The subjective mechanism score was the most useful predictor of TAI. Radiographic scores had some value but were insensitive for intimal injuries. CT had 100% sensitivity and 100% negative predictive value for TAI.

Of all the mechanisms of injury studied, high speed (>60 mph) injury was the only statistically significant risk factor and TAI was diagnosed 11 of 245 patients with this mechanism. A subjective score 4 or 5 awarded by the emergency physician on mechanism identified 22 of 30 TAIs and did achieve significance. The specificity was poor (22 of 612 patients). No patient with a score of 1 had an aortic injury but only eight patients were awarded this score. The chest radiographs were also awarded a subjective score by the emergency physician before being seen by a radiologist for a more detailed assessment. Twenty of the 30 patients with TAI were awarded a score of 4 or 5 (specificity 20 of 470) but seven patients with TAI were given a chest radiograph score of 1 or 2. These were intimal injuries.

CT was 100% sensitive and had a negative predictive value of 100% for TAI in this study. The specificity varied between 50% and 98% and the positive predictive value between 3% and 39% depending on the definition of a positive scan—three different definitions were used. Not all patients with a negative CT underwent an aortogram.
Critique—Most accident and emergency departments in the UK rely on doctors maintaining a high index of suspicion and liberal use of CT to diagnose this injury. This paper supports both these strategies but the evidence presented for CT is impressive. This is a large prospective study including a prospective clinical and radiological assessment of the likelihood of TAI. However, not all the 1561 patients were given these scores. The paper proposes that patients with a low subjective score based on mechanism of injury and a normal chest radiograph do not require imaging. This might miss some intimal injuries but these patients were usually treated conservatively. A subjective score will always rely on the experience and training of the staff involved, and cannot be extrapolated outside the context of the hospitals in which the study took place. The advent of highly sensitive helical CT may help reduce the need for aortography. Perhaps it is time to review the policy in your own hospital.

Effect of prehospital advanced life support on outcomes of major trauma patients
M Eckstein, L Chan, A Schneir, *et al*
J Trauma 2000;**48**:643–8
This is a retrospective analysis of the effects of artificial ventilation of 496 major trauma patients who received either bag-mask-valve ventilation or intubation before admission. The insertion of intravenous lines was also studied although the amount of fluid given was not recorded. Anaesthetic agents nor muscle relaxants were used during intubation. The main findings are that neither intubation or cannulation prolonged overall on-scene times. There was no improvement in the patient outcome for either procedure. Patients treated with bag-mask-valve ventilation were 5.3 times more likely to survive ($p = 0.00$). The authors did try to adjust the mortality ratio for Injury Severity Score (but for some reason not for Glasgow Coma Scale). The methodology is not robust and could have been easily improved and this throws major doubts on the validity of the conclusions.

Non-skeletal cervical spine injuries: epidemiology and diagnostic pitfalls
D Demetriades, K Charalambides, S Chahwan, *et al*
J Trauma 2000;**48**:724–7
This retrospective study of 292 patients with cervical spine injuries reviews the management and diagnostic problems involved in dealing with the intoxicated or unconscious patient in whom the cervical spine cannot be cleared clinically. Seventy five (25.2%) had neurological signs on admission. Thirty one (10.6%) had subluxations without bony injury and 11 (3.8%) had cord injury without fracture or subluxation.

The authors found that a combination of plain lateral films and computed tomography (CT) was effective in detecting or producing a high index of suspicion for injury in all cases of subluxation. CT was less effective at diagnosing isolated cord injury (two of four) but all cases were diagnosed by magnetic resonance imaging (MRI). Isolated cord injuries may not be detected by CT and MRI is rarely acutely available, however spinal immobilisation is not required in these cases as there is no instability. Corticosteroids and decompression surgery are the treatment options.

The authors accept that retention of the cervical collar and full spinal precautions is difficult for any period of time on an ITU. They advocate early full CT of the cervical spine in all patients that cannot be clinically evaluated as fractures and subluxation will be detected or at least suspected in all cases by the combination of plain films and CT. A prospective study of these recommendations is currently in progress.

The effect of organised systems of trauma care on motor vehicle crash mortality
A B Nathens, G J Jurkovich, P Cummings, *et al*
JAMA 2000;**283**:1990–4

This paper uses interesting methodology to examine trends in mortality over a 16 year period and to try and relate changes to improvements in the organisation of trauma systems. Given the ongoing debate on the optimal organisation of trauma services within the UK this paper makes interesting reading. The crude non-adjusted crash mortality rates seemed to decrease by the same amounts in those states with and those without an organised trauma system. However the "age adjusted reduction in crash mortality" was 8% greater in those states with trauma systems but that no effect is seen for 10 years after the opening of the first trauma centre. The statistics used seem complicated. The paper tries to allow for possible confounding factors such as the implementation of compulsory seat belt laws and the imposition or relaxation of drink/driving and speed limit legislation. Seat belt legislation and drink driving legislation significantly reduced death rates, increasing the speed limits significantly increased death rates.

Acute compartment syndrome: who is at risk

M M McQueen, P Gaston, C M Court-Brown
J Bone Joint Surg (Br) 2000;**82-B**:200–3

This paper examines the risk factors associated with acute compartment syndrome in 164 patients seen in an orthopaedic unit over eight years. Fractures, especially of the tibia, were the most common cause but nearly a quarter of cases were the result of soft tissue injury. The predominant mechanisms of injury in these cases were direct blunt blows and crushing force to the affected compartment. The group of patients most at risk were young men. This was thought to be attributable to increased muscle bulk producing "tighter" compartments even pre-injury.

Compartment syndrome rarely presents in accident and emergency but this paper is a timely reminder that a fracture is not required for the diagnosis, and that without suspicion and prompt treatment the consequences for the patient can be disastrous.

Sedation and analgesia for procedures in children

B Krauss, S M Green
N Engl J Med 2000;**342**:938–45

Sedation for painful procedures in children has been a popular subject for small scale studies at recent conferences in the UK. This excellent article reviews existing practice and should be required reading in any department considering using sedation rather than restraint. There are at least 12 different sets of guidelines in existence, produced by different bodies, all of which are referenced. There is a brief revision of the states of sedation followed by a description of the personnel, facilities and monitoring required. The use of supplementary oxygen is discussed. This is often regarded as mandatory as it should decrease the incidence and severity of hypoxia. The author makes the point however that it will also delay the detection of hypoxia by pulse oximetry, and that if used then chest moments must also be continually monitored.

The final section reviews the pharmacology of sedation and analgesia including a table of doses, effects and contraindications for all the drugs covered.

Fluid resuscitation of patients with multiple injuries and severe closed head injury: experience with an aggressive fluid resuscitation strategy

J York, A Arrillaga, R Graham, *et al*
J Trauma 2000;**48**:376–80

This is a retrospective review of 34 patients with multiple injuries that included a severe closed head injury. All had a GCS of 8 or less and an Injury Severity Score of greater than 15. All 34 patients in the study received aggressive fluid resuscitation to maintain normal haemodynamics and cerebral perfusion pressures. Mortality and morbidity compared favourably with previously published studies of similarly injured patients. Not enough data are given to make a definite comparison, but those patients who were not intensively monitored (PA catheter with/without ICP measurements) seem to have better outcomes. The study claims to show that aggressive management of the circulation is needed, often with large volumes of fluid. This study has a large number of methodological flaws that need serious consideration, not least that it probably represents a post hoc analysis of data collected for another trial.

Attempted nail gun suicide: fluid management in penetrating cardiac injury

P A Catarino, J C Halstead, S Westaby
Injury 2000;**31**:209–11

This paper is a case report of an attempted suicide using a nail gun. The nail penetrated the right ventricle but on admission the patient was haemodynamically stable with no respiratory compromise. The patient was transferred to the nearest cardiothoracic centre and with advice that minimal intravenous fluids should be given to reduce the risk of increasing haemorrhage and tamponade. The nail was removed in theatre and recovery was uneventful.

Factors affecting prognosis with penetrating wounds of the heart

J G Tyburski, L Astra, R F Wilson, *et al*
J Trauma 2000;**48**:587–90.

A retrospective review of 302 patients with penetrating wounds of the heart requiring emergency thoracotomy. Altogether 152 had a thoracotomy in the emergency department. No patient with no vital signs at the scene survived. Five of 27 (19%) of patients losing vital signs in the emergency department survived.